

UP-3917-3.05

FASTRAND INTERRUPT AND ERROR CONTROL ROUTINE

UP-3917-3.05

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1. INTRODUCTION

1.1. SCOPE

This document provides information necessary for using the Fastrand Interrupt and Error Control routine (*FINT). Programming procedures, error designations, and coding examples are included herein. An understanding of the use of the Fastrand external function (XF) instruction (See the Fastrand Real Time/Mass Storage Peripheral manual, UP-3920-3.01) is necessary for the use of this document.

1.2. GENERAL DESCRIPTION

*FINT provides the basic interrupt and error control for Fastrand I and II for programs that operate without an executive routine. *FINT uses information placed in Arithmetic Register 1 (AR1) by the worker program to issue Fastrand XF instructions, and upon completion of the XF, transfers status information to a field that is designated by the worker program.

*FINT is a procedure that is called from a system's tape by the worker program during assembly. Parameters on the call line can be used to include the following two options in the *FINT routine:

■ Head-count overflow.

This option provides for the issuance of a second XF instruction to complete the execution of an XF during which a head-count overflow has occurred.

■ One order lister.

This option permits control to be returned to the worker program when a Fastrand order is issued by *FINT. However, if an order is given to *FINT while a previous order is in process, control will not be returned until the preceding order has been completed and the current order is issued.

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2. PROGRAMMING PROCEDURES

2.1. *FINT CALL LINE

The *FINT call line directs the assembler to include the *FINT PROCedure in the assembly. It must appear only once in the worker program. The maximum core memory requirement is 485 locations.

CE	LABEL		OPERATION		OPERANDS				
5	6	7	11	13	18	19	30		40
				* F I N T		P ₁ , P ₂ , P ₃			

Where: P₁ = NOMOD. This parameter is required.

P₂ = HDOVF, instructions will be generated which enable the *FINT routine to retain control in the event of a head-count overflow, and issue a second order to complete the first. This parameter should be written only when the worker program does not need notification of the head-count overflow on multiple sector operations.

If this parameter is omitted, deduct 25 from the core memory requirement.

P₃ = NLIST, if the one order lister is not needed. In this case the user does not have to initialize (JR XINER) or close (JR XCLFR) the *FINT routine.

If this parameter is written, deduct 55 from the core memory requirement.

Examples of the *FINT call line as it might appear in a worker program:

CE	LABEL		OPERATION		OPERANDS					COMMENTS	
5	6	7	11	13	18	19	30	40	45	46	50
		(1)		* F I N T		N O M O D ,	H D O V F ,	N L I S T			Core requirement: 430 Loc.
		(2)		* F I N T		N O M O D ,		N L I S T			Core requirement: 405 Loc.

2.2. INITIALIZATION

To initialize the *FINT routine, the programmer must write:

OPERATION		OPERANDS				COMMENTS	
11	13	18	19	30	40	45	50
	J R		X I N F R				Initialize *FINT.

This line must be executed before giving any drum orders (packets) to the *FINT routine.

If P₃ of the *FINT call line is NLIST, initialization is not required.

2.3. EXECUTION

To give a FASTRAND drum order to *FINT, the user must execute a JR XCTFR with a 16 character drum packet in AR1. The format of the packet is the same as that which is required by the operating system's FASTRAND drum handler.

The FASTRAND drum packet (loaded in AR1 by the worker program) has the following format:

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
XF Instruction					Memory address of 9 character control word in worker program.			Sector or character count and the core memory address of the input or output area.				Unit, position, head, sector, and FASTBAND indicator.			
30 bits					18 bits			24 bits				24 bits			

The fields in the drum packet are described as follows:

- The XF instruction must contain all the necessary bits to accomplish the desired FASTRAND drum function (unit bits are ignored and should be zero).
- The control word is a 9 character field in the worker program to which the contents of tetrads 58 and 59 will be transferred upon the completion of the XF instruction, whether successful or not. In the left-most character (LSC-8) of this field *FINT will store a completion status character. The possible binary values of this character and the corresponding meanings are:

- 0 = the order is still in process
- 1 = successful completion
- 2 = unrecoverable FASTRAND drum error
- 3 = unsuccessful search
- 4 = head-count overflow
- 5 = attempted write in a locked-out position

This status character must be preset to binary zero by the worker program before giving each packet to *FINT.

- Sector or character count and input/output area core memory address bits (24 bits, in locations 8 through 11 of AR1) have the following format:

8	9	10	11
s s s s s s	s s r c c c	c c c c c c	c c c c c c

Where:

- s-s = sector or character count, (8 bits)
- r = reserved, (1 bit)
- c-c = core memory address of input/output area, (15 bits)

These 24 bits will be stored in tetrad 56 by *FINT prior to the issuance of the XF order.

- Unit, position, head, sector, and FASTBAND indicator bits (24 bits, in locations 12 thru 15 of AR1) have the following format:

12	13	14	15
r u u u p p	p p p p p p	h h h h h h	s s s s s s

Where:

- r = reserved, (1 bit)
- u = unit, (3 bits)
- p = position, (8 bits)
- h = head, (6 bits)
- s = sector, (6 bits)

These 24 bits will be stored in tetrad 57 by *FINT prior to the issuance of the XF order.

The following example illustrates the coding required to issue the drum packet:

11	OPERATION		OPERANDS		COMMENTS	
	13	18 19	30	40	45 46	50
	BA 1	m m m m , 1 6			16 character packet to AR1.	
	J R	X C T F R			enter issue section of *FINT.	

Where: m m m m = the storage address of the 16 character packet.

An example of the coding necessary to give two packets to the *FINT routine operating with the one order lister, with processing in between:

OPERATION		OPERANDS			COMMENTS	
11	13	18 19	30	40	45 46	50
	P D	C O N T A - 8 , 1			pad status character, packet A.	
	B A 1	P A C K A , 1 6			bring packet A to AR1.	
	J R	X C T F R			give the packet to *FINT.	
	. At this point the worker program can process the previously read record.					
	P D	C O N T B - 8 , 1			pad status character, packet B.	
	B A 1	P A C K B , 1 6			bring packet B to AR1.	
	J R	X C T F R			give the packet to *FINT.	
	C C	C O N T A - 8 , 1			test for successful completion.	
	J U	E R R O R			of packet A order.	
	C C	C O N T B - 8 , 1			test for completion of packet.	
	J G	\$ - 5			B order.	
	J U	E R R O R				
	. To normal processing.					

An example of the coding for two packets, which might appear in another section of the worker program:

CE 16	LABEL 7	11	OPERATION		OPERANDS		COMMENTS	
			13	18 19	30	40	45 46	50
			X F	0 4 , 0 , 0 , 6			XF order: position head.	
			+ 3	C O N T A			address of control word.	
			+ 4	0				
	P A C K A		+ 4	0			24 bit drum address.	
	C O N T A		+ 9	0			control word for packet A.	

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SE	LABEL	OPERATION	OPERANDS	COMMENTS
6	7	11	13 18 19 30 40 45 46 50 60	
		X F	0 2 , 0 , 0 , 6	XF order: write sector.
		+ 3	CONT B	address of control word.
		+ 4	FAREA + 0 2 0 0 0 0	sector count and input area address.
	PACKB	+ 4	0	24 bit drum address.
	CONTB	+ 9	0	control word for packet B.

*Note: Before giving a packet to the *FINT routine, the drum address must be stored in the last four characters of the packet.*

2.4. CLOSING

To ensure the completion of the last order when the one order lister option is used, a JR XCLFR should be executed.

The following example illustrates the coding required to close the routine:

OPERATION	OPERANDS	COMMENTS
11 13 18 19 30 40 45 46 50		
JR	XCLFR	enter close section of *FINT.
CC	mmmm - 8, 1	test for successful completion.
JU	ERROR	

Where: mmmm = the storage address of the control word.

3. ERROR CONTROLS

The following table describes the actions taken by *FINT to handle Fastrand error interrupts, and the display stop or control word status character associated with each interrupt.

DISPLAY STOP / STATUS CHARACTER	ERROR	ACTION
16UU55	Memory (core) parity error.	Unit being accessed is stored in UU of display stop.
16UU77	Non-ready.	Unit being accessed is stored in UU of display stop. Permits correction of Non-ready condition, and re-issues order when SYSTEM START is depressed.
2	Recorded memory address, first phase shift, or second phase shift.	Inserts head positioning bit into XF instruction and reissues order. If two reissues are unsuccessful, status character is set to two, contents of tetrads 58 and 59 are stored in control word, and control is returned to interrupted program.
2	Missing sector.	Same as for recorded memory address error, except that no head positioning bit is inserted in XF instruction.
3	Unsuccessful search.	Status character is set to three, contents of tetrads 58 and 59 are stored in control word, and control is returned to interrupted program.
4	Head-count overflow.	If $P_2 \neq \text{HDOVF}$: Status character is set to four, contents of tetrads 58 and 59 are stored in control word, and control is returned to interrupted program. If $P_2 = \text{HDOVF}$: Order is issued to complete the first order, and control is returned to interrupted program.
5	Attempted write in locked-out position.	Status character is set to five, contents of tetrads 58 and 59 are stored in control word, and control is returned to interrupted program.
	Memory overload anticipated, or unit busy.	Order is reissued and control is returned to interrupted program.

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